05 AUTHORS

We are very pleased to have twelve authors in this issue of Physio Network:

Adam Johnson, Dr Teddy Willsey, Dr Sandy Hilton, Todd Hargrove, Christina Le, Tom Goom, Prof Nicola Phillips, A/Prof Steve Kamper, Dr Bart Dingenen, Mariana Wingood, Dr Jarod Hall & Robin Kerr.

08 The Adductor Strengthening Programme prevents groin problems among male football players: a cluster-randomised controlled trial [video]

Author: Adam Johnson

11 Effect of a 6-week Weighted Baseball Throwing Program on Pitch Velocity, Pitching Arm Biomechanics, Passive Range of Motion, and Injury Rates

Author: Dr Teddy Willsey

14 Sticks and Stones: The impact of language in musculoskeletal rehabilitation

Author: Dr Sandy Hilton

17 Does muscle guarding play a role in range of motion loss in patients with frozen shoulder? [video]

Author: Todd Hargrove
Does anterior cruciate ligament reconstruction improve functional and radiographic outcomes over nonoperative management 5 years after injury? [quiz]

Author: Christina Le

Acute sensory and motor response to 45-s heavy isometric holds for the plantar flexors in patients with Achilles tendinopathy [video]

Author: Tom Goom

Muscular and neuromuscular control following soccer-specific exercise in male youth: Changes in injury risk mechanisms

Author: Prof Nicola Phillips

Effectiveness of Kinesio Taping in patients with chronic non-specific low back pain: a systematic review with meta-analysis

Author: Assoc Prof Steve Kamper
The relationship between hip muscle strength and dynamic knee valgus in asymptomatic females: A systematic review [quiz]
Author: Dr Bart Dingenen

Walking While Talking and Risk of Incident Dementia
Author: Mariana Wingood

Pain, Motion and Function Comparison of Two Exercise Protocols for the Rotator Cuff and Scapular Stabilizers in Patients with Subacromial Syndrome
Author: Dr Jarod Hall

Different ways to balance the spine in sitting: Muscle activity in specific postures differs between individuals with and without a history of back pain in sitting [quiz]
Author: Robin Kerr

Quiz Answers

Click for audio reviews!
Sandy graduated from Pacific University (Oregon) in 1988 with a Master of Science in Physical Therapy and a Doctor of Physical Therapy degree from Des Moines University in December 2013. She has worked in multiple settings across the US with a neurologic and orthopedic emphasis including a focus in pelvic rehabilitation for pain and dysfunction. Sandy teaches and speaks internationally on the treatment of pelvic pain, and the application of pain science into clinical practice.

Adam has worked in full time football at both Reading FC and Millwall FC, he originally joined Brighton & Hove Albion FC as Head Academy Physiotherapist. After performing in this role for two and a half years, he progressed to take up his current role as First Team Performance Physiotherapist. This job involves devising injury prevention protocols for the whole squad and individuals. The role has led him to take an interest in injury prevention literature, and more specifically hamstring injury prevention literature.

Dr. Teddy Willsey is a sports medicine focused physical therapist and private practice owner in Rockville, Maryland. Teddy has an interest in working with high level athletes and return to sport rehab. In addition to practicing PT, Teddy speaks and teaches publicly, writes and blogs regularly, and posts on social media daily. He can be found on Instagram at @strengthcoachtherapy or online at www.teddywillsey.com.

Sandy graduated from Pacific University (Oregon) in 1988 with a Master of Science in Physical Therapy and a Doctor of Physical Therapy degree from Des Moines University in December 2013. She has worked in multiple settings across the US with a neurologic and orthopedic emphasis including a focus in pelvic rehabilitation for pain and dysfunction. Sandy teaches and speaks internationally on the treatment of pelvic pain, and the application of pain science into clinical practice.

Todd graduated from Hamilton College in 1990 with a B.A. in Economics, and from the University of Washington School of Law in 1995 with a J.D. While working as an attorney, Todd developed chronic neck and back pain, but eliminated it through through self-education, lifestyle change and exercise. Since 2008, he has written a blog at BetterMovement.org, which focuses on applying a modern understanding of pain science and neuroscience to movement-based therapies.
Prof Nicola Phillips is an Internationally Registered Sports Physical Therapist who has worked in sport and exercise for 30+ years. She leads the MSc Sport and Exercise Physiotherapy programme at Cardiff University, UK and undertakes consultancy work in the sport and exercise field. She teaches to physiotherapists internationally on rehabilitation of sports injuries, strength and conditioning principles and exercise prescription. Her research work is in the areas of motor control following injury, particularly lower limb, as well as investigating barriers and facilitators to exercise. Her doctoral studies were on functional coping following ACL injury.

Christina Le is a physiotherapist (Glen Sather Sports Medicine Clinic) and PhD student (University of Alberta) from Edmonton, Canada. As a clinician, she primarily worked with athletes with anterior cruciate ligament (ACL) injuries. This experience has motivated her to pursue research investigating quality of life in those with ACL injuries. Find her on Twitter as @yegphysio or online at www.yegphysiotherapy.com.

Tom Goom is a physio who specialises in running injury and loves to run! He’s the creator of Running-physio.com a published researcher and international speaker, presenting his popular Running Repairs Course all over the world!

Assoc. Professor Steve Kamper is a research physiotherapist at the School of Public Health, University of Sydney. He is also co-lead of the ‘Centre for Pain, Health and Lifestyle’ (https://www.centrephl.org), a practice-research partnership exploring the interaction between pain and health risk factors such as overweight, physical inactivity, smoking, alcohol misuse and mental health. Other research interests include patient expectations and placebo effects, adolescent musculoskeletal pain, research methods.
Bart Dingenen (physical therapist, PhD) currently combines an academic postdoctoral position at University Hasselt (Belgium) with clinical work as a sport physical therapist in a private clinical practice (Motion to Balance, Genk). He is mainly interested in strategies to optimize prevention and rehabilitation of sports-related injuries of the lower extremity.

Mariana Wingood is a full time clinician and part-time educator. She is an active member of the Vermont Falls Coalition, Gerontology Society of America, and Academy of Geriatrics. Mariana’s focus is on fall prevention and exercise prescription for older adults. She has presented at a state, national conferences, and international level.

Dr. Jarod Hall, PT, DPT, OCS, CSCS is a physical therapist in Fort Worth, TX. His clinical focus is orthopedics and therapeutic neuroscience education. Jarod is a board certified Orthopedic Clinical Specialist and Certified Strength and Conditioning Specialist. Jarod is also an adjunct instructor at the UNTHSC DPT program in the orthopedics, pain sciences, and manual therapy curricula. Dr. Hall presents continuing education at the local, state, national level and is an internationally recognized evidence based blogger.

Robin Kerr is an Australian trained physiotherapist with 33 years of clinical experience. Her special interests lay in pelvic floor and lumbo-pelvic dysfunction. She is heavily trained in biomechanics and gait lab running analysis, however over the last 20 years has moved towards a focus on motion and the BPS model in the management of persistent pain. You can find more about Robin and her team here www.alchemyinmotion.com.au
THE ADDUCTOR STRENGTHENING PROGRAMME PREVENTS GROIN PROBLEMS AMONG MALE FOOTBALL PLAYERS: A CLUSTER-RANDOMISED CONTROLLED TRIAL

ADAM JOHNSON

BACKGROUND & OBJECTIVES:
According to recent studies in professional football, adductor strains are the second most common cause of injury reported with almost 10% of all injuries over the course of a season reported as involving the adductors. A risk factor attributed to adductor-related injury is low strength levels within the associated musculature. Therefore, the objective of this study was to identify the effectiveness of a specific adductor strengthening exercise in the reduction of adductor-related groin injuries.

METHODS (WHAT THEY DID):
The authors pooled the data from a total of 31 separate cohorts whom all met their inclusion criteria. All cohorts were required to undergo a loading protocol for mid-portion AT. Two authors independently gathered eligible studies, assessed risk bias, and measured treatment effects.

Loading protocols were organized into four categories: heavy eccentric calf training, modified heavy eccentric calf training, eccentric overload, and eccentric overload with active rest. Only studies that used validated and reliable pain and outcome measures were included. Studies with sample sizes less than 50 were considered to be at high risk of sample bias.

RESULTS/WHAT THEY FOUND:
The primary outcome of the study found that there was a 41% lower risk of reporting groin problems within the intervention group. They found than on average in the intervention group there was a 13.5% weekly prevalence of groin problems, with this figure sitting at 21.3% for the control group. The researchers also found an 18% lower risk of substantial groin problems in the intervention group, however this did not reach statistically significant values.
“There was a 41% lower risk of reporting groin problems within the intervention group.”

LIMITATIONS (THINGS TO KEEP IN MIND):

Things to consider in this study are that the cohort was a semi-professional male cohort and therefore the findings may not be transferable to the wider population of females, youths and elite athletes. We should also consider that the study used their own “all physical complaints” terminology for reporting purposes, and this limits direct comparisons to other similar studies which report “time loss” injury rates.

VIDEO:
CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):

Recent research has suggested that the burden of groin injuries has gradually decreased over the past decade, however they still present a significant burden to professional sports teams. This study presents positive findings that the Copenhagen Adduction exercise may be beneficial in reducing the burden of these injuries. One exciting aspect of this study is that the exercise prescription means that only one weekly set of the exercise was performed in-season. If there is indeed a 41% reduction of risk of injury with less than five minutes of weekly intervention then these are significant findings for those clinicians working within sports settings. What is also a real positive of this study is that the protocol does not require any equipment at all, and therefore is transferable to all levels of sport and could also be performed within clinic rooms, or prescribed for patients to perform at home.

Another key aspect to this protocol is that the participants were provided with two potential regressions of the exercise whereby they could perform the exercise at shorter lever lengths, or just perform a side lying adduction exercise if they presented with pain over 3/10. This study design meant that there was high compliance levels of over 70% and could potentially be a lesson for similar studies which struggle with subject compliance. The fact that the design also begins with the most difficult exercise and allows for regressions is an interesting design structure, with most studies proposing progressions as participants become competent. However, this study design emphasizes that the greater loading is what will help protect the participants from injury and this is a really positive element.

In conclusion this study provides positive indications that the Copenhagen Adduction Exercise would be a suitable selection of exercise in attempting to reduce adductor entity injury risk and could be implemented within the practice of therapists who are working with groups at risk of these injuries.

+ STUDY REFERENCE

EFFECT OF A 6-WEEK WEIGHTED BASEBALL THROWING PROGRAM ON PITCH VELOCITY, PITCHING ARM BIOMECHANICS, PASSIVE RANGE OF MOTION, AND INJURY RATES

DR TEDDY WILLSLEY

BACKGROUND & OBJECTIVE:
Weighted ball programs have become increasingly popular in youth sports as increasing emphasis is placed on baseball pitch velocity and early sport specialization. This study seeks to define, explain, and quantify the adaptations seen with weighted ball programs. The purpose of this study was to explore the effects of training with a weighted ball on pitch velocity, passive range of motion (PROM), muscle strength, elbow torque, and injury.

METHODS (WHAT THEY DID):
During the baseball offseason, 38 healthy youth pitchers (age 15 +/- 1.2 years) performed a throwing program and strength training program 3 x per week for 6 weeks. Recruits were excluded if they had a history of injury in the past 12 months. The 38 subjects were randomized into a control (n = 19) and experimental group (n = 19), with the control group throwing only with 5-ounce regulation weight balls and the experimental group throwing with under and overweight balls ranging from 2 ounces to 32 ounces.

Over the course of the 6-week program, throws were performed from 3 common baseball drill positions: knee (half kneeling), rocker (similar to split stance), and run and gun (crow hop). Baseline measurements were taken at the onset of the study and then reassessed following the aforementioned 6-week intervention. Highly reliable and novel methods were used to measure some of the more difficult to quantify variables: elbow varus torque and shoulder IR velocity were measured using an elbow sleeve with an embedded inertial measurement unit and strength was measured via handheld dynamometry.

RESULTS (WHAT THEY FOUND):
There was a 3.3% increase in throwing velocity in the training group whereas the control group did not improve velocity. The most significant and explanatory finding of the increased velocity was a 4.3° increase in external rotation passive range of motion (ER PROM). 80% of the experimental group participants that finished the study demonstrated increases in pitch velocity, while 67% of the control group demonstrated increases in velocity as well but to a lesser degree: 1.0 m/s increase versus 0.3 m/s increase, respectively.

Interestingly, the control group had a 13% increase ER strength whereas the training group demonstrated no change in ER strength. It should be noted however that ER strength comprised a large part of the strength & conditioning program both groups performed. There were no significant changes in post-testing angular velocity or valgus stress.
“While the gains in velocity may be faster in weighted ball programs, the risk is likely not worth the reward for a large percentage of baseball players.”

LIMITATIONS (THINGS TO KEEP IN MIND):

It should be noted that the control group started with a 3.3% higher pitch velocity average than the training group. This would theoretically indicate there was less room for improvement in the control group, thus making the results of the study seem less convincing. Pitching velocity has a finite ceiling.

There were significant limitations to the study design. A larger sample size may have been able to better detect group differences, as some of the results were not consistent with previously held assumptions. This study was performed on participants between the ages of 13 to 18 as well, clearly affecting its generalizability. It was also noted that the weighted ball throwing program used in this study was more conservative than the average program commercially available, thus making the injury risk potentially even higher with these programs.

Furthermore, the training group sustained 2 upper extremity throwing injuries and 2 unrelated lower extremity injuries, resulting in a decreased post-test group size from 18 to 14 participants. These injuries were not accounted for in the quoted numbers of 80% participants increasing their velocity.
CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):

Weighted ball throwing programs have increased in popularity in recent years due to the increased emphasis placed on pitching velocity within the sport of baseball. The most unequivocal takeaway from this study was the 4.3° increase in ER PROM, leading to a 3.3% increase in velocity. This study shows a weighted ball training program can be an effective means of improving pitch velocity, as long as the pitcher stays healthy.

The significant risk of injury associated with weighted ball training programs makes it a difficult proposition when weighing cost to benefit. 24% of the training group sustained an upper extremity injury—2 during the 6-week program and 2 in the subsequent season. Whereas, there were zero injuries sustained in the control group.

Weighted ball training programs are not necessary for pitchers to improve velocity. As shown in the study, pitching velocity increases are possible with sound strength and conditioning programs and a throwing program involving only standard 5 oz. balls. While the gains in velocity may be faster in weighted ball programs, the risk is likely not worth the reward for a large percentage of baseball players.

+ STUDY REFERENCE

STICKS AND STONES: THE IMPACT OF LANGUAGE IN MUSCULOSKELETAL REHABILITATION

DR SANDY HILTON

BACKGROUND & OBJECTIVE:
The body of literature regarding musculoskeletal rehabilitation focuses on the search for effective and efficient treatments of pathoanatomical changes. The authors of this viewpoint write in support of the critical importance of the words used to describe both musculoskeletal conditions and the nature of pain itself. They stress the need to consider psychological factors in the prediction of outcomes of pain and disability, and encourage clinicians to take seriously the ability to influence the expectations of recovery based on language and word choice. They present an argument that clinicians should deliberately use their words to support a positive view of recovery and specifically avoid pathoanatomical language such as “degenerative discs” and catastrophic images. The authors state that ignoring the psychological impact of the words used to describe musculoskeletal conditions risks negative therapeutic outcomes.

METHODS (WHAT THEY DID):
This is an opinion paper with supporting references from the literature; there is no data collection and no systematic or comprehensive literature review on the subject. Clinical and expert opinion serves an important purpose in the literature and may direct future research.

They present a case example of Ben, a 15-year-old track athlete who has a conceptual model that back pain will lead to loss of function and persistent pain. “Ben says that he feels broken and cannot switch off the thought that he is going to need spinal surgery.” The authors describe phrases that can reconceptualize pain and function for Ben. They emphasize the need to choose words that give an image of resilience and recovery versus frailty and chronic pain. An example of “therapeutic emplotment” is used to describe how a therapist can set the scene for a patient to expect success through a focus on what the patient can do vs what they are not able to do.

Key points of the article are for clinicians to take a panoramic view of how the biomedical or musculoskeletal problems relate to the life of the patient. They recommend keeping the individual in the center of care by considering a couple of key questions - “What does it all mean to them?” and “How can I help them find a positive outlook in this situation?”.

RESULTS (WHAT THEY FOUND):
Not applicable to this type of study.
“The most powerful resource that clinicians have at their disposal - the person seeking care.”

LIMITATIONS (THINGS TO KEEP IN MIND):

While clinical experience and expert opinion are important for advancement of clinical care and shaping the direction of future research, it is important to keep in mind that this paper is inherently biased and is not meant to replace a well-designed research study.

Language and meaning are culturally and individually sensitive. Words that are harmful for one group may not carry the same weight in another group. It is tempting to think there can be a list of words that will be universally positive and helpful. It is more likely that the concepts presented here need to be translated into the individual experiences of the clinician and to each individual patient with appropriate cultural sensitivity.
**CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):**

This viewpoint highlights an important part of individualized care – the words we choose in the clinic and in our educational material hold massive potential to be encouraging, hopeful, and reassuring for people suffering in pain or disability. They hold equal potential to be deflating, discouraging, frightening, and lead to depression and hopelessness. Words are powerful!

The authors recommend, “Psychological factors need to be acknowledged and understood, and deliberately used as part of therapy.” This requires that therapists have proper education on how to assess psychosocial factors and also that they have a conceptual basis for how to construct therapeutic interventions in a helpful and consistent way. Currently, this is not consistently part of practice and is infrequently taught in professional education programs.

There are resources for clinicians to build their skill base in working through a biopsychosocial framework. A good place to start is the recommendations from the International Association for the Study of Pain (IASP) and their freely available Pain Curriculum, which provides guidance on necessary education for health professionals. Authors such as Nijs, Moseley, Butler, Griffin, Smart, Thompson, O’Sullivan (and more) have written on clinical application and provide examples of conceptual frameworks.

The key questions noted above from the paper emphasize the most powerful resource that clinicians have at their disposal - the person seeking care. Ask that person what they need, how their pain or disability is affecting their life, what they think will happen, etc. Listen to the words they use and match their style for delivering honest messages of hope and resilience. Empowering the patient to develop their own stories and metaphors of success will provide positive ripple effects into the community and help shift public perception from one of musculoskeletal fragility (#textneck and #sittingdisease) to resilience, hope, and reassurance.

**+ STUDY REFERENCE**


**Click to return to Contents Page**
DOES MUSCLE GUARDING PLAY A ROLE IN RANGE OF MOTION LOSS IN PATIENTS WITH FROZEN SHOULDER?

TODD HARGROVE

BACKGROUND AND OBJECTIVE:
Idiopathic frozen shoulder is a common cause of pain, restricted range of motion, and reduced function in the shoulder. It usually comes on unexpectedly and progresses slowly. It is thought to be self-limiting, often resolves spontaneously, and continues for an average of 30 months.

Although the cause for the symptoms of frozen shoulder is unknown, it is commonly thought to involve chronic inflammation, fibrosis and contracture of capsuloligamentous structures around the glenohumeral joint. This study questioned that explanation, asking whether reduced range of motion might be due to active muscle guarding. To answer this question, it measured passive range of motion under general anesthesia.

METHODS/WHAT THEY DID:
Five patients diagnosed with frozen shoulder volunteered for this study. Each had painful, global restriction of passive shoulder movement. Researchers measured passive shoulder range of motion into abduction and external rotation before and after general anesthesia.

RESULTS/WHAT THEY FOUND:
Prior to anesthesia, passive range of motion into abduction was severely restricted in each patient. Four out of five were restricted in external rotation, and one had normal external rotation range of motion. After anesthesia, passive abduction ROM increased in each patient, with increases ranging between 55 degrees and 110 degrees. Three of the five participants increased their range of motion into external rotation, with increases ranging between 15 degrees and 40 degrees. Two patients did not increase their external rotation ROM, although one started with normal ROM.

The researchers concluded that active muscle guarding is likely a major contributing factor to limited range of motion in frozen shoulder. They stated that structural contracture might also play a role, because one patient failed to improve a limited ROM into external rotation. They also concluded that passive range of motion testing for frozen shoulder is likely invalid in cases where muscle guarding may be involved.
LIMITATIONS/THINGS TO KEEP IN MIND:

The sample size in this study was very small. However, the results were dramatic and suggestive. The shoulder abduction measurements were performed without stabilizing the scapula, and therefore the study cannot differentiate between increases in range of motion due to glenohumeral movement versus scapular movement. However, given the large increase in overall range of motion, it is highly unlikely that changes in glenohumeral movement did not play a significant role.

VIDEO:
“Treat frozen shoulder in the same way we might treat back pain, as a complex disorder with neurological and psychosocial elements.”

**CLINICAL IMPLICATIONS/HOW THIS IMPACTS CLINICAL PRACTICE:**

Frozen shoulder has been a source of confusion for some time. It occurs in approximately 10% of the general population and up to 29% of diabetics. There is no definitive test for frozen shoulder. It is usually diagnosed in patients with painful restriction of range of motion into two planes (including external rotation) after various other pathologies are excluded, such as osteoarthritis, significant rotator cuff disease, dislocations, fractures or avascular necrosis.

The cause of frozen shoulder is unknown. Studies have suggested that chronic inflammation, fibrosis and glenohumeral joint capsule contracture play a role in restricted ROM, and therefore treatment usually focuses on lengthening these structures. However, physical therapy aimed at this goal works no better than placebo injection, and arthroscopic capsular release has been shown by randomized controlled trials to be ineffective.

Based on the results of this study, researchers propose that we treat frozen shoulder in the same way we might treat back pain, as a complex disorder with neurological and psychosocial elements, such as fear of pain and anxiety. For example, we know that back pain is associated with increased stiffness and muscle guarding, and treatments are often directed towards staying active, reducing protective muscle activity, and reducing fear related to movement. Applying this logic to frozen shoulder would suggest the use of treatments that are directed more at modifying perception than structure.

**+ STUDY REFERENCE**

DOES ANTERIOR CRUCIA
TE LIGAMENT RECONSTRUCTION IMPROVE
FUNCTIONAL AND RADIOGRAPHIC OUTCOMES OVER NONOPERATIVE
MANAGEMENT 5 YEARS AFTER INJURY?

CHRISTINA L E

BACKGROUND & OBJECTIVE:
To operate or not to operate? That is the question when dealing with anterior cruciate ligament (ACL) ruptures. Unfortunately, the answer is not a simple yes or no. Despite evidence of successful outcomes with either operative or non-operative treatment, there still remains a strong bias toward ACL reconstruction following injury.

To inform the answer to this question, clinicians and patients must understand the long-term outcomes of operative and non-operative treatment. In this cohort study, patients who selected ACL reconstruction and those who selected non-operative management were compared on various outcomes 5 years after surgery or completion of non-operative rehabilitation, respectively. Specifically, differences in muscle function, hop performance, patient-reported outcomes, and radiographs were examined.

METHODS (WHAT THEY DID):
Patients recruited between 2005 and 2011 as part of a completed randomized controlled trial were asked to return for 5-year testing. At the 5-year mark, patients underwent a battery of knee function tests including quadriceps strength (dynamometer), single leg hop, crossover hop, triple single leg hop, timed 6-metre hop, and joint effusion (modified stroke test). In addition, patients completed a variety of questionnaires: Knee Outcome Survey-Activities of Daily Living Scale (KOS-ADLS), global rating scale (GRS) for knee function, International Knee Documentation Committee (IKDC) Subjective Knee Form 2000, Knee injury and Osteoarthritis Outcome Score (KOOS), Marx Activity Rating Scale (Marx), Tampa Scale for Kinesiophobia (TSK), ACL-Return to Sports After Injury (ACL-RSI) scale, and visual analog scale (VAS) for pain. Lastly, radiographs were completed and medial and lateral tibiofemoral compartments were assessed for the presence of osteoarthritis (Kellgren-Lawrence system and joint space width).
RESULTS/WHAT THEY FOUND:

There were 105 patients who returned for 5-year testing. Of those who returned, 83 patients underwent ACL reconstruction and 22 patients selected non-operative rehabilitation. The groups did not differ in age, sex, body mass index, concomitant injuries, or second ACL injuries. However, there were a greater proportion of patients who participated in level 1 activity (i.e. cutting and pivoting activities) in the operative group.

Comparing the knee function tests, the operative and non-operative groups did not differ in quadriceps index or any of the hop tests after controlling for pre-injury activity level. A larger proportion of the operative group had a knee joint effusion at time of testing compared to the non-operative group. The operative group reported better scores on the GRS, TSK, and VAS but there were no differences on the other questionnaires. No differences in radiographic characteristics examining the involved or uninvolved limbs were found. Lastly, 61% of the operative group and 50% of the non-operative group reported that they were currently at pre-injury activity level.

“This study should make clinicians and patients think twice about immediately deferring to surgery for the management of ACL rupture.”

LIMITATIONS/THINGS TO KEEP IN MIND:

Considering the bias toward ACL reconstruction, particularly in the United States where this study was performed, the number of individuals who chose surgery was much higher than those who chose rehabilitation alone. As a result, the non-operative group was smaller than the operative group which may have affected the validity of the study findings.

In addition, the rehabilitation protocol for either group is not described. With a reasonable proportion of the patients continuing to participate at their pre-injury activity level, a detailed protocol could have helped guide many clinicians who treat this injury.
**CLINICAL IMPLICATIONS/HOW THIS IMPACTS CLINICAL PRACTICE:**

Unlike many previous studies examining long-term outcomes, this study boasts tremendous retention while assessing both objective and subjective tests. This study provides a better understanding of long-term strength, hop function, knee effusion, various patient-reported measures, and radiograph-defined osteoarthritis.

The discrepancies in the GRS and TSK met or exceeded minimal detectable changes which suggests clinical relevance of these results. It is possible that the non-operative group was more cautious of their ACL-deficient knee. This finding emphasizes the importance of restoring both physical and psychological function following ACL injury. The remainder of the outcomes suggest that there are minimal long-term functional and radiographic differences between individuals who choose operative compared to non-operative management of an ACL rupture. The similarity of these two groups at the 5-year mark presents an interesting argument in favour of non-operative treatment. However, it is unknown whether the same results would be seen at the 1-2 year mark, which is perhaps a more relevant timeframe for athletes wanting to return to sport.

Whether a patient should undergo ACL reconstruction depends on numerous factors, including type and level of sport or occupation demands. However, this study should make clinicians and patients think twice about immediately deferring to surgery for the management of ACL rupture.

**STUDY REFERENCE**

ARTICLE BY CHRISTINA LE

QUIZ

Question —
Name two outcome measures that were equal after 5 years between the operative and non-operative groups in this study?

Click here to link to quiz answer
ACUTE SENSORY AND MOTOR RESPONSE TO 45-S HEAVY ISOMETRIC HOLDS FOR THE PLANTAR FLEXORS IN PATIENTS WITH ACHILLES TENDINOPTHY

TOM GOOM

BACKGROUND & OBJECTIVE:
Isometric exercise has become increasingly popular to reduce pain in tendinopathy following Ebonie Rio’s exciting research. Her study showed an impressive and immediate reduction in pain with isometrics for patella tendinopathy, and later work showed this to be effective in-season for volleyball and basketball players. Despite this, research in other sites of tendinopathy is lacking or has shown different results which might question the growing use of isometrics clinically. In this study Seth O’Neill and colleagues sought to clarify the role of isometrics in achilles pain by testing the approach used by Rio et al. (2015) in achilles tendinopathy.

METHODS (WHAT THEY DID):
16 subjects with achilles tendinopathy participated in the study. Pre-intervention, pain was assessed during a functional task that loads the achilles tendon - bilateral calf raises, single leg calf raises or hopping. Mechanical pain sensitivity, motor output and peak plantar flexion torque were also measured. Heavy isometric plantar flexion (at 70% of maximal voluntary contraction) was performed for 45 seconds, with 5 repetitions separated by 2-minute rest periods. The above tests were then repeated post-intervention.

RESULTS/WHAT THEY FOUND:
A varied response was seen during a functional task with some subjects reporting an increase in pain and some a small decrease. The mean self-reported pain was 4.2 (out of 10) before isometrics and 4.9 after. This contrasts markedly from Rio et al. (2015) who reported a reduction from 7 to 0. There was no significant change in mean mechanical pressure pain thresholds. Only one measure of plantar flexion torque increased by a statistically significant value but this did not exceed the minimum clinically important difference.
“There...appears to be a variable response to isometrics, but they do serve as a reasonable starting point for a loading approach for certain patients.”

LIMITATIONS/THINGS TO KEEP IN MIND:

This is an excellent study and it’s clear that every effort was made to replicate the approach used by Rio et al. (2015). There are some limitations to consider. Of the 16 subjects only 9 reported pain during the functional tests. The study also only measured short term response, so we should be careful in generalising to the long term effects of utilising isometric exercises in achilles tendinopathy. We may have also seen different results using different exercises or dosages, or in different populations, but we can’t assume those results would be better.
CLINICAL IMPLICATIONS/HOW THIS IMPACTS CLINICAL PRACTICE:

The authors conclude that, “Based on data from the present study, heavy 45-s isometric contractions cannot be recommended for immediate pain relief or improved motor output as first stage rehabilitation for patients with Achilles tendinopathy.”

From a purely evidence-based point of view there is little to support isometrics in Achilles tendinopathy. Arguably the 3 most key achilles tendon rehab approaches to date (that of Alfredson et al.1998, Silbernagel et al. 2007 and Beyer et al. 2015) didn’t feature isometrics extensively. The short-term effect appears variable in Achilles tendinopathy and the long-term effect is largely unknown.

From a clinical stand point there also appears to be a variable response to isometrics, but they do serve as a reasonable starting point for a loading approach for certain patients. Rather than abandoning them altogether we could utilise them for patients that either A) have an immediate reduction in pain with isometrics or B) are unable to tolerate other approaches such as heavy slow resistance training.

We also need to be mindful of ‘bandwagons’ in physiotherapy. Rio et al.’s initial research was exciting and showed a large change in pain, but it was a small study of just 6 subjects with patellar tendinopathy. This alone isn’t evidence enough to support the widespread use of isometrics across a range of different tendinopathies. The collective evidence suggests isometrics create a variable response that is likely to differ between different pathologies, presentations and pain sites, and between different individuals.

+ STUDY REFERENCE

MUSCULAR AND NEUROMUSCULAR CONTROL FOLLOWING SOCCER-SPECIFIC EXERCISE IN MALE YOUTH: CHANGES IN INJURY RISK MECHANISMS

PROF NICOLA PHILLIPS

BACKGROUND & OBJECTIVE:
Neuromuscular control (NMC) has been suggested to be a modifiable risk factor for sports injury. Fatigue has also been shown to have a detrimental effect on NMC and there is some evidence to suggest that the effect could be age specific. This study looked at the effect of football (soccer)-specific fatigue on various aspects of neuromuscular control. As such, it is intended to be a paper to support a rationale underpinning appropriate conditioning to minimise fatigue-related changes, that could predispose to injury in sport. The authors linked this to knee and lower limb injuries in particular and in the context of a younger athlete population.

METHODS (WHAT THEY DID):
The authors looked at 18 healthy, elite 14-15 year old male footballers. Measures were taken before and after a fatigue protocol, which was a modified SAFT (soccer-specific aerobic field test) 90 protocol (2x35 mins), to adapt to the typical times of match play for this age group. The SAFT90 is a football specific shuttle test that includes various agility drills and changing intensity, in response to standardised commands.

They used Opto-jump to measure reactive strength during a typical 30cm drop jump and leg stiffness, during a trial of 20 jumps at a set frequency. Stiffness was calculated in kN/m, using a referenced, standardised approach. Concentric quads and hamstring strength was measured using an isokinetic dynamometer at 60°/s, 180°/s, 360°/s. Absolute Peak Torque was collected in Nm. EMG activity of vastus medialis (VM), vastus lateralis (VL), rectus femoris (RF), medial and lateral hamstrings was recorded during strength testing.

RESULTS (WHAT THEY FOUND):
There were significant reductions in EMG activity in RF, VM, medial hamstrings but not VL or lateral hamstrings. Reactive Strength Index, relative and absolute leg stiffness all showed significant decreases post-fatigue protocol. There were no significant differences in Hams/Quads ratios calculated from Peak Torque values.
LIMITATIONS (THINGS TO KEEP IN MIND):

There were relatively small numbers in this study and this is seen in the statistical analysis, to some extent. There were some questions around how exactly data was collected and the relatively limited familiarisation could have failed to exclude a learning effect but despite this, there were still some significant reductions in measures. Some of the tests could also have created more fatigue and there was limited detail on how this was managed, as well as the length of time it would have taken to collect, which could conversely have linked to potential recovery following the fatigue protocol.

It was also not exactly clear whether or not eccentric as well as concentric strength data was collected but only concentric was used for the H/Q scores. As so much football activity is eccentric it is perhaps not surprising that concentric ability was not significantly different.

“The study supports the use of exercise prescription that facilitates fatigue resistance in this age group.”
CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):

Muscle tendon unit stiffness is an important component of any plyometric activity, and the increased ground contact times and reduced flight times associated with a reduction in stiffness will have an impact on the ability to control ground reaction forces, deceleration and rapid changes of direction, all essential for a sport such as football.

The EMG activity changes, showing that fatigue affected medial rather than lateral dynamic control, signifies a potential reduction in functional joint stability towards the end of a fatiguing activity. As much of the knee injury prevention strategies emphasise the importance of medial dynamic control, the findings support that thinking.

All of these factors will have an effect on running and jumping performance and could also potentially link to lower limb injury. The authors suggest an added risk in that children appear to be more sensitive to fatigue changes than adults, which could be linked to a protective/inhibitory mechanism. Overall, the study supports the use of exercise prescription that facilitates fatigue resistance in this age group, in addition to coaching good movement patterns.

+ STUDY REFERENCE

EFFECTIVENESS OF KINESIO TAPING IN PATIENTS WITH CHRONIC NON-SPECIFIC LOW BACK PAIN: A SYSTEMATIC REVIEW WITH META-ANALYSIS

ASSOC PROF STEVE KAMPER

BACKGROUND & OBJECTIVE:
The back pain treatment marketplace is a crowded one. One of the more colourful options available is Kinesio Tape; soft, elastic adhesive tape that is applied to the painful body region. The proposed physiological rationale is that the tape creates ‘convolutions’ on the skin which reduces mechanical nociceptor activity, improves blood flow and reduces pain. The treatment became very popular following aggressive marketing campaigns at the 2008 and 2012 Olympics games, and has been enthusiastically adopted by many physiotherapists. Since then there has been a steady accumulation of research evidence related to the effectiveness of this treatment for various clinical conditions. This systematic review aimed to gather and synthesise the findings of studies that investigate the effectiveness of Kinesio Taping for people with chronic low back pain.

METHODS (WHAT THEY DID):
The researchers searched biomedical databases to find randomised controlled trials that assessed the effectiveness of Kinesio Tape for adults with chronic back pain. They conducted several meta-analyses to estimate the pooled effects on pain and disability. They separated the analyses to look at whether Kinesio Tape was more effective than nothing, than placebo, and whether it improved outcomes when added to another intervention. The researchers followed best-practice methods to ensure they included all the relevant published studies, avoided errors when screening, judged the risk of bias associated with included studies, and assessed the overall quality of the evidence.

RESULTS (WHAT THEY FOUND):
They found 11 relevant RCTs, which were generally of fairly small size (range n=20 to n=148), and methodological quality was generally quite good. None of the studies reported long-term outcomes.

Results of the meta-analyses were quite consistent. There was low quality evidence that Kinesio Tape does not improve pain or disability compared to nothing, compared to placebo, or when added to another intervention. Between group differences were neither statistically significant nor clinically meaningful.
“Providing Kinesio Tape as a stand-alone intervention, or adding it to other treatments does not improve pain or disability in people with chronic back pain.”

LIMITATIONS (THINGS TO KEEP IN MIND):

The most important limitations with this review were the small sample sizes and heterogeneity in findings. These issues are related. The measure of effectiveness that comes from any single small study is imprecise and therefore could be quite different from the ‘true’ effectiveness of an intervention. That means if we look at measures from a series of small studies together we expect them to bounce around a bit. The idea is that a meta-analysis makes use of a larger sample size (the total number of participants) to find a more stable estimate. The heterogeneity and small total sample sizes are the main reason that the quality of the evidence was rated as very low or low.
CLINICAL IMPLICATIONS:

This systematic review was conducted and reported well. The authors found that providing Kinesio Tape as a stand-alone intervention, or adding it to other treatments does not improve pain or disability in people with chronic back pain. The authors conclude that there is no evidence to support providing this treatment in practice.

The quality of the evidence assessing the effectiveness of Kinesio Taping in this population is low at best. In situations such as this, the argument is often made that this study provides “no evidence of effect, rather than evidence of no effect”. The implication being that clinicians are justified in continued provision of the intervention based on some other information, for example patient preference or their own recall of previous clinical encounters. An alternate interpretation is based on the likelihood that small trials are expected to be biased in the direction of showing a larger effect of the intervention. If this is the case, less biased estimates of effect from larger, better controlled RCTs conducted in the future will probably conclude that the intervention is even less effective than shown here.

The results of this review sit within an increasing body of literature that questions the value of Kinesio Taping in improvement of clinical outcomes. Importantly, the authors considered evidence investigating the effects of adding Kinesio Tape to other interventions, which arguably reflects clinical practice better than providing the tape by itself. The pooled effects from these more pragmatic trials were very similar to those looking at Kinesio Tape alone versus nothing, or placebo. The consistency of these effect sizes supports the conclusion that the intervention is really not effective in this population.
+ THE RELATIONSHIP BETWEEN HIP MUSCLE STRENGTH AND DYNAMIC KNEE VALGUS IN ASYMPTOMATIC FEMALES: A SYSTEMATIC REVIEW

DR BART DINGENEN

BACKGROUND & OBJECTIVES:
Lower extremity valgus during dynamic activities has been related both prospectively and retrospectively to lower extremity injuries such as patellofemoral pain and anterior cruciate ligament injuries. One of the common clinical beliefs is that hip muscle weakness is related to this specific biomechanical pattern. A previous systematic review in 2012 found limited evidence for a relationship between hip muscle strength and dynamic lower extremity valgus in males and females. However, new studies have been published since 2012, and the influence of the strength and task measures was not known.

The aim of this systematic review was to summarize current evidence investigating the relationship between hip muscle strength and dynamic lower extremity valgus during dynamic tasks among asymptomatic females. Secondly, this study aimed to investigate whether the relationship between hip muscle strength and dynamic lower extremity valgus was dependent on the strength measures or tasks being assessed.

METHODS (WHAT THEY DID):
Four electronic databases were systematically searched. Peer-reviewed studies were included if they investigated the relationship between hip muscle strength and dynamic knee or lower extremity valgus in healthy females above 18 years of age. Hip muscle strength measures were defined as isometric, isokinetic or isotonic strength measures using reliable methods. Biomechanical measures included 3D measures of kinematics related to dynamic lower extremity valgus (i.e. any combination of hip adduction/internal rotation, knee abduction and tibial internal rotation).

The methodological quality of included studies was assessed with the Joanna Briggs Institute checklist for cohort studies. Meta-analyses were performed where two or more studies used similar tasks.
RESULTS (WHAT THEY FOUND):

This review demonstrates that there is conflicting evidence for a relationship between hip muscle strength and dynamic lower extremity valgus in female athletes. Five studies reported no relationship between hip muscle strength and dynamic lower extremity valgus. Eight studies found an association between greater peak lower extremity valgus and reduced hip muscle strength, while three studies found greater hip muscle strength to be associated with greater lower extremity valgus. However, when task-specific meta-analyses were performed, reduced hip muscle strength was more likely to be associated with greater dynamic lower extremity valgus for single-leg ballistic tasks, and to a lesser extent single leg squat tasks, but not for double-leg ballistic tasks.

“The relationship between hip muscle strength and dynamic lower extremity valgus may be task-specific.”

LIMITATIONS (THINGS TO KEEP IN MIND):

The main limitation of the current literature is the considerable variation in methods used to measure hip muscle strength and dynamic lower extremity valgus. For example, it can be questioned whether an isometric muscle test in a non-weight bearing position relates to how hip muscles function during dynamic athletic tasks. However, 89% of the included studies evaluated hip muscle strength isometrically in non-weight bearing positions. Perhaps both the strength testing and the dynamic movement tasks assessed have not challenged athletes to a level that is reflective of sport-specific situations.

From a biomechanical point of view, it is important to note that all studies only evaluated peak lower extremity valgus values, thereby reducing the whole stance phase to a single value, which may underestimate or even mask more subtle relationships between hip muscle strength and dynamic lower extremity valgus across the rest of the stance phase. In addition, focusing only on the lower extremity and neglecting movement patterns more proximally (e.g. trunk) potentially underestimates the importance of hip muscle strength.
CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):
The results of this study suggest that the relationship between hip muscle strength and dynamic lower extremity valgus may be task-specific. More demanding ballistic single-leg tasks likely challenge lower limb and trunk coronal plane biomechanics to a greater degree than double-leg tasks. Clinicians should therefore be very careful making generic conclusions across tasks.

The relationship between hip muscle strength and dynamic lower extremity valgus is more complex than some clinicians may conceive. Human movement patterns are multifactorial. Strength is only one of the factors potentially affecting a specific movement pattern. Clinically, it should also be emphasized that reporting a correlation is not the same as causation, i.e. just because hip muscle weakness and dynamic valgus may correlate does not necessarily mean that hip weakness is causing the valgus.

+ STUDY REFERENCE


DR BART DINGENEN
Question —

Complete the sentence by placing these two phrases in the appropriate place: double-leg ballistic tasks, single-leg ballistic tasks.

Reduced hip muscle strength was more likely to be associated with greater lower extremity valgus for ______________, but not for ______________.

Click here for quiz answer
WALKING WHILE TALKING AND RISK OF INCIDENT DEMENTIA
MARIANA WINGOOD

BACKGROUND & OBJECTIVE:
In today’s busy society it seems that everyone is attempting to dual/multi-task. However, research has identified that dual-tasking results in deterioration in the quality of task performance. As individual’s age and/or develop a cognitive impairment, the level of task deterioration increases. Part of this is secondary to decreased executive function which is the primary cognitive component involved in dual tasking. Additionally, they may have poor task prioritization, resulting in prioritization of the cognitive task over the gait and/or balance task. The other part is difficulty with primary motor tasks such as decreased postural control and/or gait deviations.

To examine an individual’s ability to dual task, a highly reliable and validated test, such as Walking While Talking (WWT) test, can be used. During this test the participants are asked to walk and recite alternate letters of the alphabet, a skill that is linked to executive function. Limitations identified during the WWT test is indicative of executive dysfunction, a prominent and early feature of non-Alzheimer Disease (AD) dementias. To further analyze this relationship the authors of this study examined if performance on WWT can predict incidents of all-cause dementia.

METHODS (WHAT THEY DID):
Subjects: Individuals without severe auditory/visual loss, inability to ambulate, or institutionalized were recruited from the Bronx County Population list.

Baseline Assessment: In addition to the WWT, the following gait variables were examined: gait speed, cadence, step length, swing percent, stance percent, double limb support percent, step time variability, and swing time variability. The gait evaluation was completed using GAITRite.

Follow-Up Cognitive Assessment: Verbal IQ estimates, vocabulary assessment, and the Free and Cued Selective Reminding Test were completed by Neuropsychologists every 12-18 months. Dementia diagnosed was initially screened for by experts who attended a consensus case and was then confirmed by diagnosis neuroimaging and other laboratory tests as indicated to subtype the dementia.

RESULTS/WHAT THEY FOUND:
This prospective cohort study identified that neither gait speed (p=0.39) nor gait rhythm (p=0.74) were associated with increased risk of developing dementia. When examining all gait variables together it was identified that a one unit increase in gait variability during the WWT was associated with a 24% increased risk of developing incident dementia and a 50% increased risk of VaD (vascular dementia), but not an increase in AD. Individually, none of the gait variables demonstrated a significant association with developing dementia. Step length (p=0.09) was the only gait variable that was near significance.
LIMITATIONS:

One of the major practical limitations is that many clinicians do not have a GAITRite system. However, there are free programs such as the reliable and valid Shaw Gait Assessment (http://www.pingmegood.com/apps/sga/) that can help clinicians with temporal gait data, such as step length. The software uses age and gender norm-referenced data for speed, step length, and step frequency (cadence).

A second limitation is the low incidence of dementia in this study. With an increase in follow-up time or number of participants, there could have been an increased number of individuals who develop dementia and possibly strengthen the associations between gait variables and dementia.

A third limitation lies in the study design. This is an observational study, meaning that causality cannot be established. However, using these findings we can state that WWT performance worsens before the clinical diagnosis of dementia.

“Clinicians should assess dual tasking in order to evaluate an older adult’s risk of falling, as well as identify any executive dysfunction or possible cognitive impairments.”

20 feet—> turn—>20 feet back
CLINICAL IMPLICATIONS/HOW THIS IMPACTS CLINICAL PRACTICE:

According to this study, an impairment identified during the walking task of the WWT predicts risk of developing all-cause dementia and incident VaD. Another important finding is that a decrease in gait speed was not associated with increased risk of developing dementia, which is inconsistent with other study results.

How to perform a WWT:

- Subject ambulates 20 feet, turns, and returns (40 feet total)
- WWT simple: walking while reciting the alphabet aloud.
- WWT complex: walking while reciting alternate letters of the alphabet with initial letter options including a, b, m, and n - with 4 trials, one for each of the four initial letters.
- Subjects are instructed to pay equal attention to both walking and talking.
- Scoring: time needed to complete the distance and documenting number of errors completed as well as gait deviations identified.

Closing Remark — Clinicians should assess dual tasking in order to evaluate an older adult’s risk of falling, as well as identify any executive dysfunction or possible cognitive impairments.

+ STUDY REFERENCE

BACKGROUND & OBJECTIVE:
The purpose of this study was to compare the effect of a pain free (NPEE) and painful eccentric exercise (PEE) program for the shoulder on pain, active range of motion (AROM), and shoulder function in those with subacromial pain syndrome (SS). While certain studies find no significant differences between eccentric and concentric exercise in SS, several studies support the EE (eccentric exercise) application. However, there is no evidence on the role of pain during exercise. This study was conducted to elucidate the differing degree of efficacy, if any, between painful vs non-painful EE for SS.

METHODS (WHAT THEY DID):
The study design was a prospective, parallel-group, randomized clinical trial which included a total of 22 subjects (11 per group) between 25 and 70 years old. Subjects were referred to a physiatrist, and to rehabilitation services after visiting the medical center with a diagnosis of SS and painful arc upon active lifting of the arm. Exclusion criteria were patients with rotator cuff tears, patients who had undergone surgery of the shoulder in the last 3 months, those with frozen shoulder, shoulder prosthesis, fibromyalgia, or malignant neoplasm, and a history of rheumatic or chronic inflammatory disease.

After baseline testing, subjects were randomly assigned into a non-painful EE group (0mm on the VAS during exercise) or a painful EE group (<40 mm on the VAS during exercise). The study design employed use of a 4-week EE program comprising 5 training sessions per week, each session lasting approximately 30 minutes. Both groups completed follow-up testing 1 day after completing the EE program.

RESULTS (WHAT THEY FOUND):
The results of this study suggest that performing EE with or without pain during exercise results in statistically similar changes in VAS, AROM, and CMS (Constant-Murley Score – a shoulder specific functional outcome measure). No statistically significant differences were found between the groups; however, in isolation, both groups improved significantly in all variables.
“Clinicians should not promote the idea that pain during exercise is harmful or will impede recovery if a patient is comfortable with reasonable levels of discomfort.”

LIMITATIONS (THINGS TO KEEP IN MIND):

The sample size in this cohort was relatively small and caution should be used when generalizing across larger populations. Furthermore, this study only focused on the application of EE to the shoulder and may not be generalized to tendinopathy in other body regions. In addition, the duration of the study was relatively short when compared to the average duration of symptoms of SS in previous research. Finally, in this study design, the diagnosis of SS was made solely based on clinical findings or painful arc sign. Theoretically, there could be a multitude a various tissue based and central nervous system-modulated pathologies that present with shoulder pain and a positive painful arc sign.

CLINICAL IMPLICATIONS (HOW THIS IMPACTS CLINICAL PRACTICE):

The findings of this study suggest that in subjects with a diagnosis of SS, an EE rotator cuff loading protocol, scapular stabilizing exercises, and stretching of the upper trapezius is effective in reducing pain and improving function and AROM in the short term, whether performed with pain (VAS <40 mm) or without pain.

This finding has far reaching implications for the way in which we explain pain during exercise to patients and the way in which expectations are set for safe and appropriate treatment. In clinical practice we frequently hear the mantras of “if it hurts, don’t do it” and “let pain be your guide”, and the inverse mantra of “no pain, no gain”. The findings in this study demonstrate that neither of these statements are right or wrong. However, it could be hypothesized that increasing fear around the experience of pain during exercise may decrease positive outcomes through fear avoidance behavior.

Conversely, the normalization of patient-determined reasonable levels of discomfort during exercise may allow for improved outcomes through quicker entry to higher level loading and expectancy violation of the commonly held belief that “hurt equals harm”.

Moving forward, clinicians should not promote the idea that pain during exercise is harmful or will impede recovery if a patient is comfortable with reasonable levels of discomfort, as there is no significant difference in outcomes in the short term.
DIFFERENT WAYS TO BALANCE THE SPINE IN SITTING: MUSCLE ACTIVITY IN SPECIFIC POSTURES DIFFERS BETWEEN INDIVIDUALS WITH AND WITHOUT A HISTORY OF BACK PAIN IN SITTING

ROBIN KERR

BACKGROUND & OBJECTIVE:
This exploratory EMG study compared the trunk muscle activation patterns adopted by male subjects with a history of low back pain (LBP) provoked by prolonged sitting in 4 specific sitting postures. A previous EMG study by the lead author was performed on 14 pain-free male subjects in 2009 to which a qualitative comparison of the current findings was performed.

METHODS (WHAT THEY DID):
Subjects were 10 males with a history of LBP provoked by sitting 1-2 hours (av. age 25; height 178cm; weight 74kg). Fine wire (+/- surface) EMG data were collected from lumbar multifidus (superficial + deep), iliocostalis (lateral + medial), longissimus thoracis and transversus abdominis in the following 4 controlled stool sitting postures:

- Slump (kyphotic thoraco-lumbar -> sacrum)
- Flat (thoraco-lumbar & L/S)
- Long lordosis (extended thoraco-lumbar and L/S)
- Short lordosis (thoracic kyphosis + L/S lordosis)

EMG amplitudes were compared between postures in the LBP group, and between pain-free and LBP groups.
RESULTS/WHAT THEY FOUND:

Muscle Activity Between Postures in LBP Group:

- Multifidus (deep and superficial) increased activity in lordotic postures > flat or slump (p=0.03)
- Multifidus superficial fibres increased activity in short > long lordosis (p= 0.058)
- Multifidus deep fibres showed no difference in activity between long and short lordosis
- Transversus abdominis increased activity in long lordosis > flat (p=0.032); and in lordosis > slump (p<0.017)

Between Groups:

- The LBP group displayed increased activity in the longissimus thoracis in long lordosis versus flat back posture, whereas the pain-free group did not.
- The LBP group did not display the modulation of multifidus activity between long and short lordotic postures compared to the pain-free subjects.

“People might need to adopt several sitting postures and keep moving around if they are destined to sit for prolonged periods.”

LIMITATIONS:

Fine wire EMG does provide some mitigation of the problems found in previous surface EMG studies. However, technology changes between 2009 (pain-free study) to present need to be considered. Additionally, sitting time in this study was relatively short and on a stool. Finally, between sex differences could not be explored in this study.
CLINICAL IMPLICATIONS/HOW THIS IMPACTS CLINICAL PRACTICE:

This study joins similar research in demonstrating that LBP is associated with changes in trunk muscle activity. EMG activity increased in longissimus thoracis and decreased in deep fibres of multifidus in the LBP group, however the authors correctly state that cause and effect relationships between LBP and muscle activity should not be assumed. Coming from a patho-mechanical and ergonomic perspective, they did mention the possibility of muscle fatigue and the possible clinical benefits of training specific spinal postures.

Cum Hoc Ergo Propter Hoc Fallacy i.e. concluding one thing caused another simply because they are often associated is common in therapy, a good example being the erroneous core stability pathway from which we are just emerging. So, on critical appraisal what do we take from this study? Taking into consideration the substantial research base on this topic, the correlation between altered EMG activity and LBP does not appear purely coincidental. Having said that causation could be in any direction – muscle activity resulting in pain, and/or pain resulting in altered muscle activity. The other possibility is that a 3rd factor is the real source of correlation. LBP is such a complex phenomenon that we should not overlook the speculative possibility of a brain/central-driven process related to a conscious or unconsciously perceived threat from prolonged sitting and lack of movement.

The authors conclude that “In clinical ergonomic interventions that modify spinal curves and sagittal balance in sitting, the muscle activity used in those postures may differ between people with and without a history of back pain”. Possibly what we can take from this study is that ‘one size does not fit all’. Instructing patients to sit up straight and not slouch may not be in their best interests with the extensor dominant pattern found in this study. It could be that people might need to adopt several sitting postures and keep moving around if they are destined to sit for prolonged periods.

+ STUDY REFERENCE


ROBIN KERR
ARTICLE BY ROBIN KERR

QUIZ

Question —
Pick the correct answer – This study shows that LBP is (caused by/ correlated with) changes in trunk muscle activity compared to pain-free individuals.

Click here for quiz answer
QUIZ
ANSWERS

Article by Christina Le
Potential answers—quadriceps strength index, hop tests, radiographic outcomes, KOS-ADLS, IKDC, KOOS, Marx

Article by Dr Bart Dingenen
Answer: Reduced hip muscle strength was more likely to be associated with greater lower extremity valgus for single-leg ballistic tasks, but not for double-leg ballistic tasks.

Article by Robin Kerr
Answer: correlated with

Click author names above to link to the original articles